

# Geology and Mineral Resources of the Athabasca Basin and Environs, Saskatchewan and Alberta

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## Summary

A new 1:500 000 scale compilation map of the Athabasca Basin and surrounding area has been recently published and will be displayed in the poster session at GeoCanada 2010. The base to the map is bedrock geology superimposed on a three-dimensional shaded relief topographic background. Another element is the locations of mineral occurrences which amongst others profile the region's prolific uranium mineralization. Drillhole locations highlight where past exploration work has been done in the Athabasca Basin. Insets on the map detail the geology and mineral occurrences of selected areas and also include regional maps of aeromagnetic data and basement geology interpretations for the basin.

## Introduction

The Athabasca Basin is host to the world's largest high-grade unconformity-related uranium deposits. A recently published compilation map (Slimmon and Pană, 2010) represents the first large (1:500 000 scale), stand-alone map separate of the Athabasca Basin region in Saskatchewan and Alberta released since 1990 (Ramaekers, 1990). In addition to updated Athabasca Group geology, a 25 km wide band of the geology of the surrounding Canadian Shield provides some insight into the basement rocks. Also included are the locations of the region's mineral resources and drillhole locations. The map shows the entire region at a scale that displays sufficient detail but is also a manageable size when printed. Geographic Information System (GIS) software was used for the compilation, although it is envisioned that the map will be used primarily as a printed product. All the datasets used in the map's construction are available from publically accessible websites referenced on the map.

## Datasets

The basin contains mainly quartzose, fluvial sequences deposited between 1760 Ma and 1500 Ma with the lithostratigraphy derived mainly from the EXTECH IV project (Ramaekers et al., 2007) with some updates (Bosman and Korness, 2007; Bosman and Schwab, 2009). The surrounding non-Athabasca Group geology, comprising mainly igneous and metamorphic Archean to Paleoproterozoic rocks and minor Phanerozoic sedimentary rocks, is derived from a 1:250 000 scale map by Pană (2010) in Alberta and from the 1:250 000 scale compilation bedrock geology series in Saskatchewan (Ashton, 2009; Slimmon, 2009).

Mineral resources on the map include all known metallic mineral showings (mineral occurrence plus assays), developed prospects (drilling delineated mineralization), deposits (calculated reserves), and mines (past, present and test producers) categorized into uranium, gold, base metal, and other groups (e.g. REE's). Index numbers for all the occurrences are provided so that additional information can be obtained from databases available on respective provincial government websites (e.g., Saskatchewan Mineral Deposit Index). Diamond drillhole locations are shown for holes drilled in the basin that intersect the basal unconformity.

Insets on the map show blow-ups of the Uranium City and Cluff Lake areas in order to display the high concentration of mineral occurrences located in these areas. Other insets include an aeromagnetic 1<sup>st</sup> vertical derivative image and a map showing the interpretive basement geology to part of the Athabasca Basin. Work is in progress to complete the basement interpretation in other parts of the basin. It is expected the map will be updated periodically to include this work and other updates such as refinements to the Athabasca Group contacts.

## Conclusion

The map is an important and timely product that profiles the geology and mineral potential of the Athabasca Basin, the world's premier uranium camp. As it was produced in a GIS environment it can be easily updated and republished as the need arises.

## References

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